RX Series Products
Phoseon
FireFly™
User Manual

March 2011

PN 18928 Rev. 2.1

Phoseon
FireFly™
SOLID STATE UV CURING SYSTEM
USERS MANUAL
PN: 18928

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Revision History

Revision	Nature of Change	Date
1.0	1st draft	May 2007
1.1	Updated Images	May 2007
1.2	Addition of Top Vent Option/Japanese Translation of Safety Label	February 2008
1.3	Include 365nm Products	November 2008
2.0	Updated Chapters 4 and 5	September 2010
2.1	Update Safety Section	March 2011

Chapter 1

Introduction

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Summary

This chapter provides a general introduction of the RX FireFly and its key characteristics and functions.

1 INTRODUCTION

Like all RX Series products the RX FireFly utilizes SLM™ technology which combines an array of light emitting semiconductor devices with high tech micro optics and micro cooling in a cost effective MOEMS (micro opto electro-mechanical system). SLM™ technology offers low cost of ownership, low energy consumption, increased productivity, long lifetime, as well as cooler operating temperature. The product's physical package is environmentally attractive with mercury and ozone free operation.

1.1 RX Series UV Curing System Components

RX FireFly UV Curing System requires the following components:

1.1.1 RX FireFly UV Light Source

The RX FireFly emits a narrow band of pure UV light between 380-420nm. Since there is no emission in the deep UV region of the spectrum, the RX FireFly does not produce ozone making it an environmentally friendly UV Curing System. See Section 2.3 for UV safety.

The product name which is shown on the product identification label will define the production configuration:

Example: FireFly™ 25x25AC395

- 25 represents the UV emitting length in mm
- x25 represents the UV emitting width in mm
- AC defines unit as air cooled
- 395 defines wavelength in nm

1.1.2 DC Power Supply

The RX FireFly utilizes standard off-the-shelf power supplies. Since RX Series products only require about 1/5 the electrical power of a traditional arc lamp; the power supply is compact and energy efficient. See the Site Requirements Section 3.3 for power supply specifications.

1.1.3 Air-Cooling

The RX FireFly is an air-cooled product. The heat generated by the semiconductor devices is dissipated with proprietary thermal management technology with no excess heat to the substrate. Since SLM™ technology produces 1/10 of the heat generated by traditional arc lamps, the cooling requirements are significantly lower resulting in lower cost of operation. See the Site Requirements Section 3.4 for air-flow specifications.

1.1.4 Control

The RX FireFly is controlled through simple voltages for easy integration. Since the semiconductor devices utilized in SLM™ technology can be turned on and off within a few milliseconds, there is no need for shutters and the light source can be enabled only when needed resulting in lower energy consumption and overall cost of operation. See the Setup Section 4.1.2 for PLC interface specifications.

Chapter 2

Safety

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Summary

This chapter provides information regarding safe operation of the RX Series Light source.

2 RX FireFly Safety

It is important that you familiarize yourself with the safety features that are incorporated into the machine to provide a safe working environment.

The ANSI Z535.4 standard (Section 4) contains the following Signal Word definitions:

The safety alert symbol indicates a possible human injury hazard exists.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices."

2.1 Protective Guards

Phoseon Technology equipment is fitted with a set of protective guards that fully enclose electrical mechanisms that may harm you or others during normal use. The fixed guards on Phoseon Technology equipment adhere to the appropriate international safety standards.

> **Note:** Do not operate the machine while any of the safety guards are open, loose, damaged or missing.

2.2 Safety Notices

Symbol	English description	German description	French description	Spanish description	Japanese description
	Safety Notices	Sicherheitshinweise	Consignes de Sécurite	Notas de Seguridad	安全通知
	Attention Read manual for safety instructions	**Vorsicht** Bitte Vorsichtsmassnahmen in der Gebrauchsanleitung lesen	**Attention** Lisez les instructions de sécurité dans le manuel	**Atención** Lea el manual de Instrucciones de seguridad	**注意** 安全上の注意のためのマニュアルを読みなさい
	UV Light Read manual for safety instructions	**UV LICHT** Vorsichtsmassnahmen in der Gebrauchsanleitung lesen	**Lumière UV** Lisez les instructions de sécurité dans le manuel	**Luz UV** Lea el manual de Instrucciones de seguridad	**紫外線** 安全上の注意のためのマニュアルを読みなさい
	Caution UV LED RADIATION HAZARD Use only with shielding in place Protect eyes & skin from exposure to UV Light	**Vorsicht** Gefaehrliche UV LED Strahlung Verwenden Sie nur mit der Abschirmung im Platz Schützen Sie Augen u. Haut vor Aussetzung zum UV LICHT	**Attention.** RISQUE UV DE RAYONNEMENT DE LED Employez seulement avec protéger en place Protégez les yeux et la peau contre l'exposition à la lumière UV	**Precaución** Radiación UV Peligrosa Use únicamente con protector presente Utilice protección de ojos y piel para evitar exposición a la luz UV	**注意** LED線照射からの紫外光にご注意下さい 安全設備をちゃんと設置してご使用下さい 照射機からの紫外光を直線に目視することや皮膚に直接照らすことをお控え下さい。

Table 2-1 Safety

Figure 2-1 FireFly Safety Label Placement (395nm Label on Left, 365nm Label on Right)

2.3 UV Safety

Phoseon makes high-intensity solid-state ultraviolet (UV) light sources for industrial curing applications. These applications require high radiance and irradiance to initiate desired chemical reactions.

CEI/IEC 62471 describes the photo-biological safety standards of lamps and LED systems. The actual source classification depends on usage, however, and when equipped with the proper interlocks and with limited viewing it is possible to make Phoseon sources safe for workers in the immediate vicinity.

Hazard Classification:
The classification scheme indicates only the potential risk. Depending upon use factors, time of exposure, and luminaire effects, these potential hazards may or may not actually become real hazards. Where the light source is intended for special applications, it should be evaluated and rated for the intended application. Distance specified in IEC 62471 for hazard classification is 200mm.

Risk groups defined in IEC 62471

Exempt means there is no photo-biological hazard for the end points in this standard.

Risk Group 1 – Low Risk
Does *not* pose a hazard due to normal behavioral limitations on exposure.

Risk Group 2 – Moderate Risk
Does not pose a hazard due to aversion response to very bright light sources or due to thermal discomfort.

Note: A portion of the RX Series UV Light source will be visible and will be a strong visual stimulus.

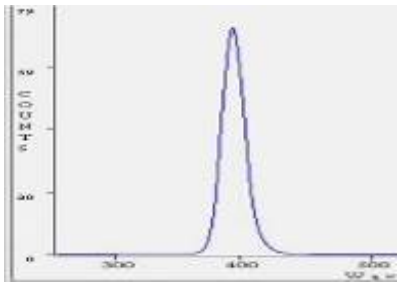

Figure 2-2 Spectral Distribution for 395nm Products

Risk Group 3 – High Risk
May pose a hazard even for momentary or brief exposure.

Phoseon's light sources are classified as Risk Group 3 under IEC 62471 *when viewed directly* and *close-up*. However, when integrated into equipment, the risk is low to moderate or the light sources are exempt depending on specific integration schemes.

Therefore, it is important that you do not look directly at the UV light source without wearing UV safety goggles. For example: UVEX SCT-orange lens which reduces eye fatigue by absorbing blue and green light and allows the operator to clearly view components during curing and inspection processes absorbs 99.9% of UV radiation and visible light up to 532nm.

Note: The RX 395nm Series products emit 90% or more of the total UV light energy between 380-420nm, and the 365nm products emit light between 345-385nm.

As with all personal protective equipment, it is the employer's responsibility to conduct an on-site or workplace hazard assessment.

2.4 Integration of RX Series System

RX Series systems are designed so that they can be professionally installed into a final product. It is the responsibility of the installer to ensure that the final product housing the RX Series components complies with the requirements of all applicable directives and standards for the product.

2.5 Restriction of Hazardous Substances (RoHS)

Phoseon Technology declares to the best of our knowledge, based on available information conducted to us, that the RX FireFly does not contain any homogeneous materials that:

- Contains lead (Pb) in excess of 0.1 weight -% (1000 ppm)
- Contains mercury (Hg) in excess of 0.1 weight-% (1000 ppm)
- Contains hexavalent chromium (Cr VI) in excess of 0.1 weight-% (1000 ppm)
- Contains polybrominated biphenyls (PBB) or polybrominated dimethyl ethers (PBDE) in excess of 0.1 weight-% (1000 ppm)
- Contains cadmium (Cd) in excess of 0.01 weight-% (100 ppm)

2.6 Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Phoseon Technology has determined that their products are not subject to EU REACH directive registration requirements.

With regards to the projected candidate list of substances of very high concern (SVHC) – issued 10 October 2008. Phoseon Technology further declares that, to the best of our knowledge, our products do not contain any currently listed SVHC above the level 0.1% by weight.

2.7 Product Recycling (WEEE)

This symbol is an internationally agreed indicator that the product bearing it should not be disposed of as general waste or garbage which might end up in landfill sites, but should instead be returned to Phoseon for reuse or be disposed of in accordance with local laws.

Figure 2-3 Do Not Recycle Symbol

Chapter 3

Site Requirements

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Summary

This chapter provides an overview of the site requirements for integrating an RX FireFly solid state curing system.

3 Site Requirements

3.1 Footprint

3.1.1 Light source Dimensions

RX FireFly	Size
Length (mm)	74
Width (mm)	48
Height (mm)	135

Table 3-1 Light Source Dimensions

3.1.2 Optional Power Supply Dimensions

Power Supply	60W
Length (mm)	181
Width (mm)	62
Height (mm)	35

Table 3-2 Power Supply Dimensions

3.2 Weight

3.2.1 RX FireFly

- RX FireFly: 0.37 kg (0.8 lb)

3.2.2 Optional Power Supply

- 60W: 0.5 kg (1.1 lb)

3.3 Electrical

The RX FireFly requires a switching power supply with constant voltage output. The power supply tested by Phoseon for use with the RX FireFly system is the Mean Well PLN-60-27 (see Appendix A). The Mean Well specs can be used as a guideline for selecting a switching power supply with the following critical specs:

- 27VDC +/- 1V delivered to the light source from constant voltage output source
- 60W minimum delivered to the light source based on configuration (see Table 3-3)
- Maximum ripple should be on the order of 0.2V peak-to-peak

Product	Power Requirement	Voltage at the Light Source	Optional Mean Well Power Supply
RX FireFly	Up to 62W	+27±1VDC	PLN-60-27 (60W)

Table 3-3 RX FireFly Power Requirements for 395nm and 365nm

3.4 Air Flow

The RX FireFly has an internal cooling fan to properly cool the components. Do not restrict the airflow, it may be necessary to exhaust air to maintain proper air flow if the system is integrated.

- Minimum clearance of 50mm should be maintained for main air inlet and exhaust ports

  Ambient Air Temp < 40°C

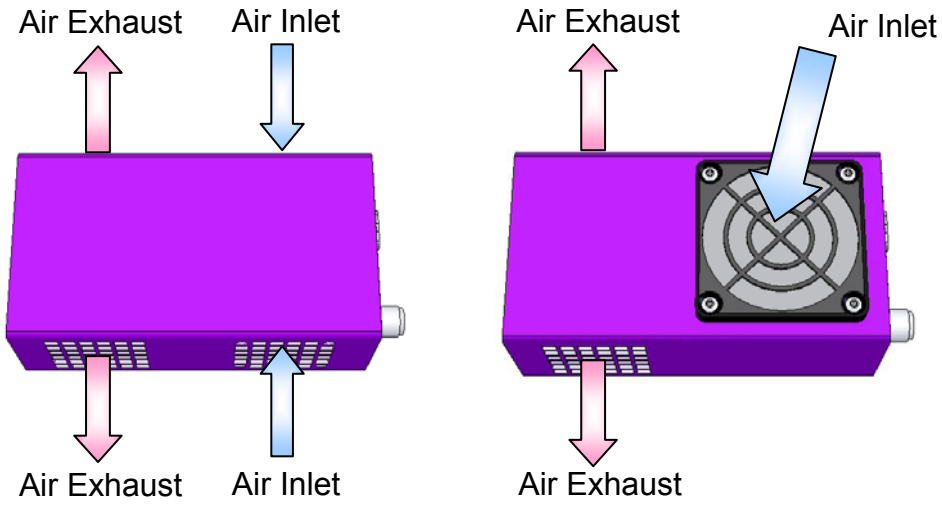

Figure 3-1 Airflow direction for RX FireFly

The RX FireFly has two air inlet configurations. The standard product has air inlet locations on the side adjacent to the air exhaust. An alternative air inlet with filter configuration is available that draws air in from the top of the unit as shown in Figure 3-1. An optional air filter assembly is also available for the side air inlet configuration. The air filter assembly consists of three components: Retainer, Filter, and Guard as shown in Figure 3-2.

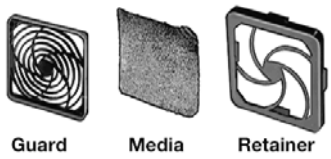

Figure 3-2 Optional Air Filter Assembly

3.5 Environmental

3.5.1 Light Source

Light Source	RX FireFly
Operating Environment	Indoor Use Only
Operating Temp (°C)	0 to 40
Storage (°C)	-20 to 85
Humidity RH non-condensing for temperatures up to 30°C	20 to 95%
Operation Altitude	Up to 3000m*

Table 3-4 RX FireFly Environmental Specifications

* Power supply selected for integration should be consistent with intended altitude requirements.

This instrument has been designed for use in harsher industrial manufacturing environments with pollution degree 3.

3.5.2 Optional Power Supply

If using the optional Mean Well power supply, environmental specifications are shown below. Please refer to Appendix A for additional Mean Well power supply specifications.

Power Supply Model	PLN-60-27
Operating Environment	Indoor Use Only
Operating Altitude	Up to 2000m*
Description	60W
Operating Temp (°C)	-30 to 50**
Storage (°C)	-40 to 80
Humidity RH non-condensing	20 to 95%

Table 3-5 RX FireFly Optional Power Supply Environmental Specifications

* Note the power supply rated altitude is lower than the light source.
** When operated above 50°C, see de-rating curve in Appendix.

Power supply pollution degree rating should be consistent with end user's environmental conditions.

3.6 PLC Control

The light source can be controlled via a PLC (Programmable Logic Controller) using the DB-9 connection. For more information please refer to section 4.1.2 of this manual.

Chapter 4

Light Source Setup

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Summary

This chapter of the manual will cover the steps required to setup the RX FireFly UV Light System.

4 Setup & Operation

The diagram below shows an overview of the components that will need to be setup for proper operation of the RX FireFly UV Light Source System.

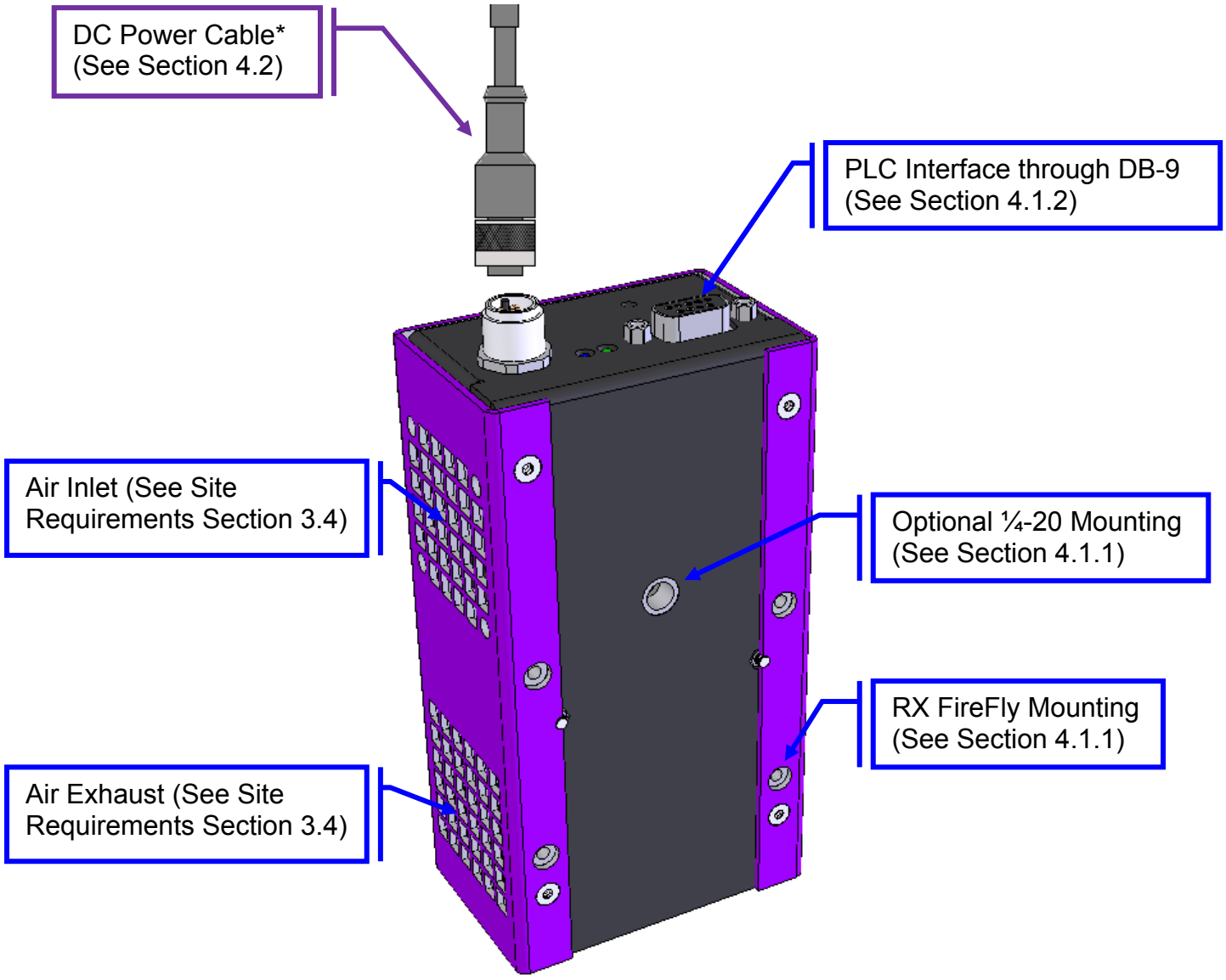

Figure 4-1 Diagram for RX FireFly System Setup

*Components shown with purple outline are options that are sold separately and are available from Phoseon.

4.1 RX FireFly Setup

An overview of the steps required to setup the RX FireFly UV Light System are shown below with detailed instructions for each step in the following sub-sections:

4.1.1 Mounting
4.1.2 PLC/Power Interface

4.1.1 Mounting:

The RX FireFly can be mounted using the mounting holes located on the back of the unit as shown in the diagram below:

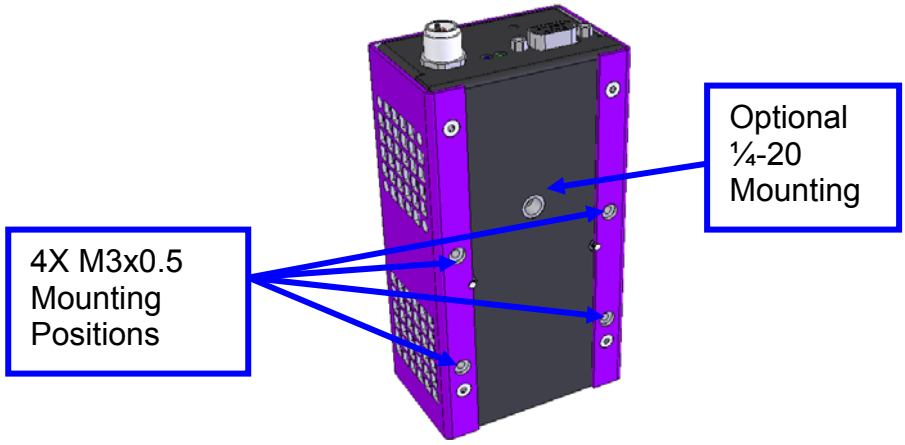

Figure 4-2 RX FireFly Mounting Holes

In order to assist users with process development, Phoseon offers an optional RX FireFly adjustable arm as shown below. The RX FireFly has a standard ¼-20 mounting hole as shown in the functional layout diagram (Figure 4-4) for ease of mounting with standard camera connections or optical bench.

Figure 4-3 RX FireFly Adjustable Arm Option

Phoseon also offers optional RX FireFly reflectors and c-mount adaptors. Contact your local Phoseon representative for additional information.

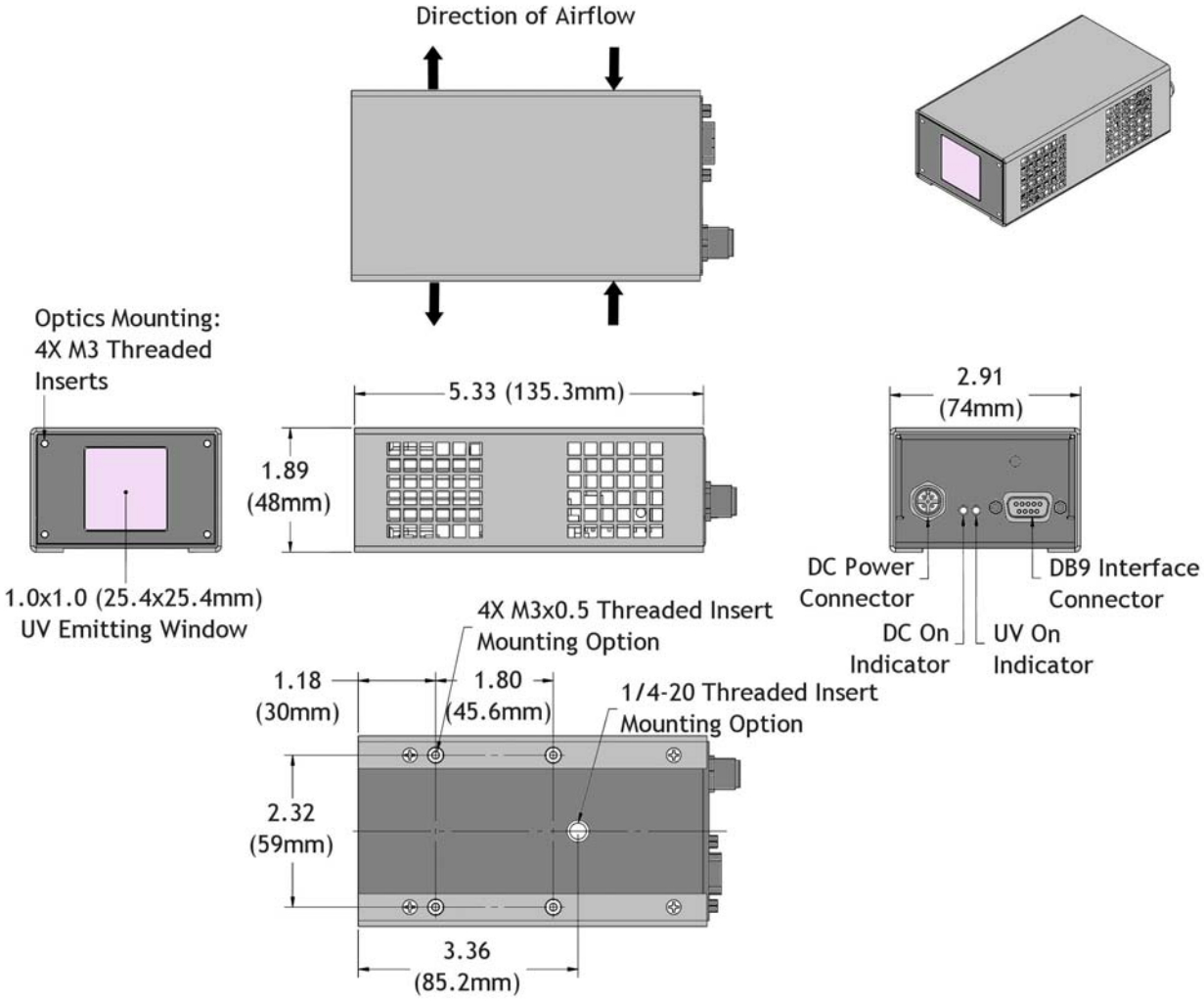

Figure 4-4 Design Layout of the RX FireFly

4.1.2 PLC Interface

The DB-9 connector is used to control the light source via a PLC. The connector, as shown below, is numbered with Pins 1-5 on the top row (right to left) and Pins 6-9 on the bottom row (right to left).

Figure 4-5 DB-9 Connection Pin Number Diagram

The DB-9 female connector on the RX FireFly has the following interface:

Pin	Function	Input/ Output	Range (min/max)	Comments
1	Enable	I	0.0V / +5.0V	TTL (transistor-transistor logic) Input: 0.0V to +0.4V = OFF (Open input will default to OFF) +3.5V to +5.0V = ON (Z_{in} = 11kΩ)
2	Do Not Use	---	---	DO NOT USE; Except to connect directly to Pin 1 if no controller is attached
3	Interlock A	---	---	Connect to Interlock B (pin 4) for operation. For use with external customer defined interlock system.
4	Interlock B	---	---	Connect to Interlock A (pin 3) for operation. For use with external customer defined interlock system.
5	Current Monitor	O	0.0V - +2.3V	Voltage Output = Current Maximum Current Load: 10mA
6	Ground	---	0.0V	Ground
7	Temperature Fault	I/O	0.0V / +5.0V	Open Collector TTL Output: 0.0V to +0.4V (ground) = Fault +3.5V to +5.0V (open) = No Fault Sink Current Maximum = 5mA See Figure 4-6 for details
8,9	Do Not Use	---	---	Do Not Use

Table 4-1 Pin Connections for the DB-9 Connector

Note: All input and output control signals; i.e. voltages, from the light source, must be referenced to the same common ground as the 27VDC input power.

The diagram below illustrates the circuitry involved if a fault should occur (pin 7).

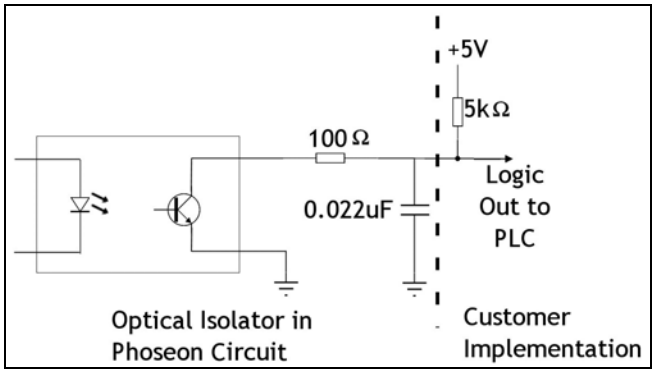

Figure 4-6 Fault (Open Collector Output) Diagram

The light source can be enabled at full intensity without connecting through a PLC interface by using the inputs/outputs available through the light source's DB-9. An optional DB-9 enable connector is also available that does the following:

- Enable light source: On/Off toggle switch connects Pin 1 to Pin 2
- Disable interlock feature: Connects Pin 3 to Pin 4

Figure 4-7 Optional Enable Switch for RX FireFly

4.2 DC Power Cable Connections for the RX FireFly

The RX FireFly light source is connected to the power supply through the DC cable harness.

Connect the DC input cable to the light source at the DC power connector following the voltage specifications shown below.

Figure 4-8 RX FireFly DC Connector

The RX FireFly light source has a M12 circular connector (Binder PN 99-3441-202-05 A-Coded) five pin male receptacle pin-out:

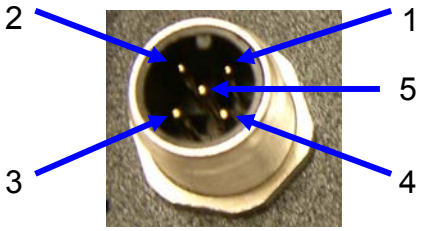

Figure 4-9 RX FireFly 5-Pin DC Connector

Pin Number	Assignment
1	+27VDC Return
2	Ground
3	Ground
4	Ground
5	+27VDC

Table 4-2 DC Power Connector Pin Diagram

DC power cable with mating female connector is available from Binder Series 763 PN 78-3440-35-05.

A DC Power Cable connects the RX FireFly light source to the power supply. If the optional power supply was purchased from Phoseon without the DC Cable, connect the DC Cable to the power supply connecting the black wire from the power supply (V-) to Pins 1-4 on the DC Connector and the red wire (V+) from the power supply to Pin 5 on the DC Connector as shown in Figure 4-10.

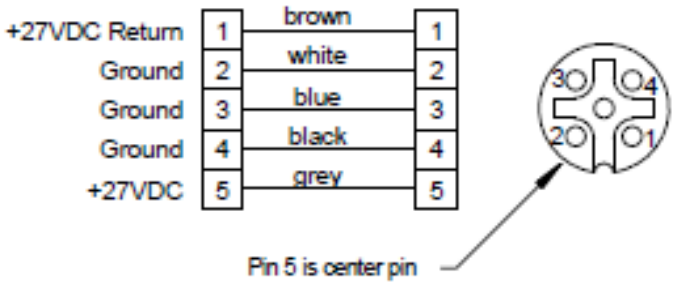

Figure 4-10 RX FireFly DC Connector Pin Diagram

4.3 RX FireFly Power Supply Setup

> **Warning**: Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

An example power supply system setup using the Mean Well power supply is shown for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Phoseon Technology cannot assume responsibility or liability for actual use based on the examples and diagrams.

> **Note**: If supplying your own power supply, please ensure it meets the specifications in the Site Requirements Section 3.3

4.3.1 Example Installation of Power Supply:

The power supply used in this example has been functionally tested for use with Phoseon's RX Series products. Specific product specifications for this power supply are provided in Appendix A for convenience. This example will cover the following:

4.3.1.1 Mounting
4.3.1.2 AC Power Cable Connection
4.3.1.3 Verify DC Voltage

4.3.1.1 Mounting Mean Well Power Supply

Mount the power supply in a position where both the AC and DC power cords will not be stressed.

Mounting information for the 60W power supply from Mean Well is provided by the vendor and shown in Appendix A.

4.3.1.2 Connecting AC Power Cable to Mean Well Power Supply

If the optional power supply was purchased from Phoseon, 2m long DC power cable (Binder Series 763 PN 78-3440-35-05 A-coded) and AC connector will be provided (US connector shown).

Figure 4-11 RX FireFly 60W Optional Power Supply with Cables

If the optional Mean Well PLN-60-27 power supply was purchased from Phoseon without DC cable and AC connector, ensure the following AC connections are made:

- Protective Earth (Green/Yellow)
- AC/L (Brown)
- AC/N (Blue)

Please refer to Appendix A for more details.

Figure 4-12 RX FireFly 60W Optional Power Supply with No Cables

4.3.1.3 Verify DC Voltage

If a power supply is used that has an adjustable voltage level, check the voltage output of the power supply and verify it is set correctly (+27VDC). Adjust if necessary.

> **Note:** Do not connect or disconnect the DC cable harness while the power supply is plugged in.

4.4 Rear Panel Indicators

The RX FireFly is designed with an indicator to tell the user when the unit is plugged in and UV light source is enabled.

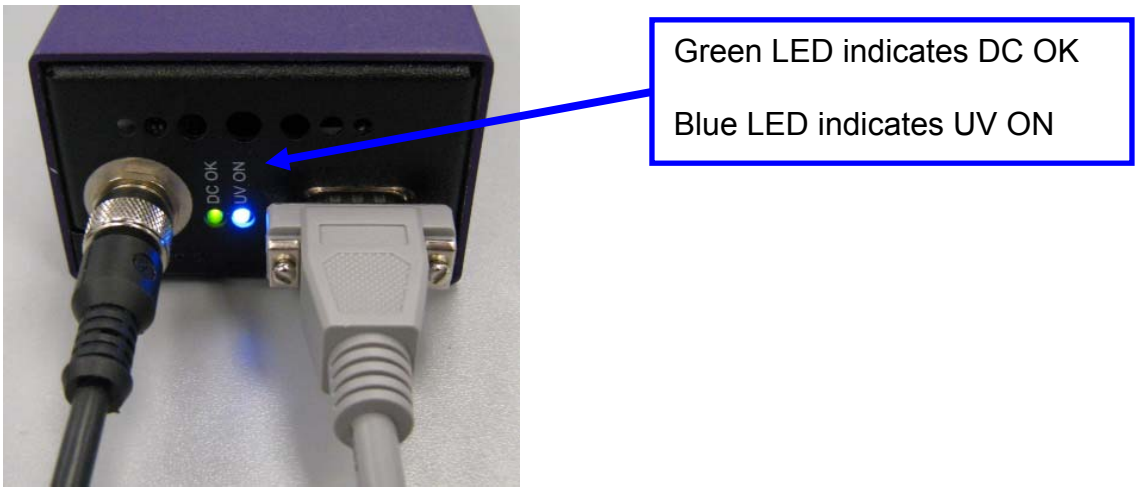

Figure 4-13 RX FireFly Indicator Lights

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Light Source Operation

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Summary

This chapter of the manual will cover the steps required to operate the RX FireFly UV Light System.

5 Light Source Operation

This section describes tips for operating the light source when integrated into equipment and covers the following:

5.1 On/Off Control
5.2 Irradiance vs. Distance
5.3 Irradiance – Total UV Power
5.4 Connecting an Interlock

5.1 On/Off Control

The RX FireFly is controlled through simple voltages. Since the semiconductor devices utilized in SLM™ technology can be turned on and off in less than 5ms, there is no need for shutters and the light source can be enabled only when needed.

RX FireFly can be turned on/off through the PLC enable circuitry Pin 3 or 4; see Section 4.1.2.

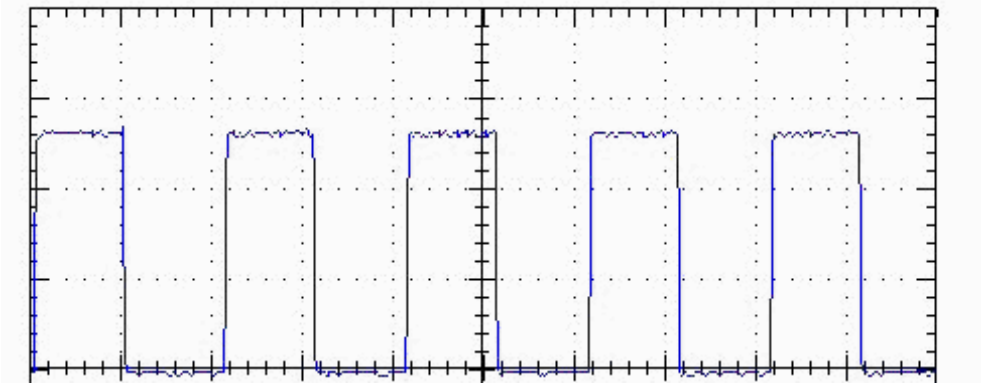

Figure 5-1 Instant On/Off

Note: When the light source is not needed (when not actively curing), turn off the light source to avoid the build-up of heat. Even if the surface of the light source is not heating up, the area around the light source (for example - any material held in close proximity to the emitting window without moving and surrounding air) can reach very high temperatures.

5.2 Irradiance vs. Distance

Phoseon RX Series light sources use optics to capture and direct the light to the work surface, but unlike arc lamps, Phoseon's light sources are area sources. Therefore, the optimum placement for the highest intensity will be closest to the UV emitting window. A typical distance from the RX FireFly to the substrate is 3-5mm. Phoseon does not use reflectors that require positioning the light source several inches away from the material.

The UV light from the emitting window of the RX FireFly does diverge with distance, so the peak irradiance will decrease as a function of distance from the protective glass.

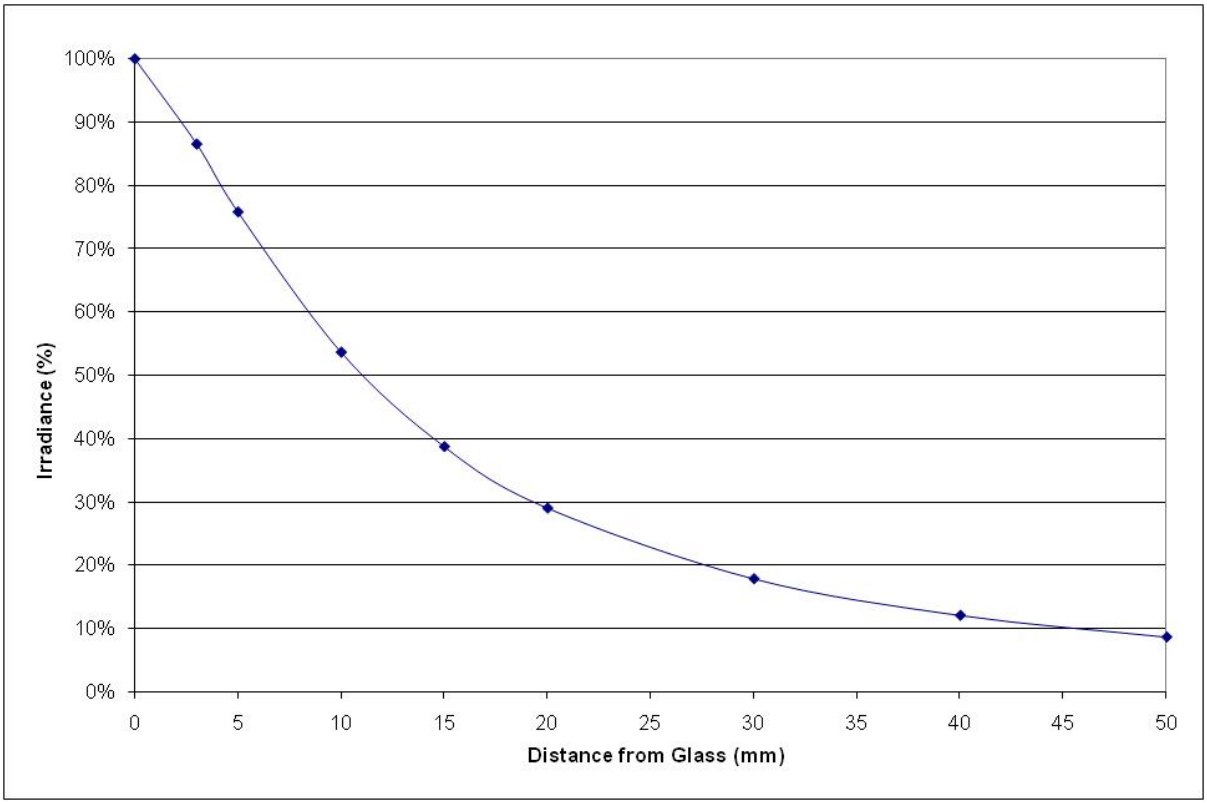

Figure 5-2 Irradiance as a Function of Distance

5.3 Irradiance – Total UV Power

Phoseon's RX Series products utilizing SLM™ technology deliver high peak irradiance over a large area generating the highest total UV Power. The total UV power produced by the RX FireFly is a function of the area of the emitting window and peak irradiance. An RX FireFly 395nm system will output up to 9W of UV Power between the wavelength range of 380-420nm.

5.4 Connecting an Interlock

The RX FireFly has the capability to support a customer supplied interlock circuit. This is useful for situations where the function of the light source is tied to an enclosure or distance above a conveyor, where the UV emission should be stopped when a door is opened or if the light source is raised a specified distance above a conveyor. An external interlock circuit is not required for light source operation. If no interlock is present, simply connect Pin 3 to Pin 4 to disable this feature.

Chapter 6

Service

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6.1 CLEANING GLASS 26
6.2 RX FIREFLY – TROUBLESHOOTING GUIDE 26
6.3 OPTIONAL TOP VENT CONFIGURATION – AIR FILTERS 27

Summary

This chapter describes service items associated with the RX FireFly light source

6 Service

For further details contact Phoseon Technology by phone at +1.503.439.6446 or email at customerservice@phoseon.com

6.1 Cleaning Glass

The emitter glass on the light source should be cleaned on an as needed basis. For light cleaning please use general purpose glass cleaner or Isopropyl Alcohol and a soft cloth. DO NOT submerge the light source or spray cleaning solution directly onto the light source.

If the material cannot be removed with glass cleaner or Isopropyl Alcohol, then a ceramic utility scraper (similar to the one shown below) can be used to carefully scrape the material off of the glass.

Figure 6-1 - Ceramic Utility Scraper for Glass Cleaning

Please note, it is the employer's responsibility to provide proper PPE (personal protective equipment) when working with hazardous chemicals or sharp equipment.

6.2 RX FireFly – Troubleshooting Guide

Symptom	Component	Action or Cause
No Light is emitted from Light Source	Power Supply	Check that AC and DC cables are wired correctly to power supply: - See Appendix A in User Manual - Check that power supply is plugged in to AC outlet
	Light Source with PLC Control	Check wiring to DB-9 connection (see Table 4-1): - Green light on and fans running - Pins 3, 4 must be tied together (interlock)
	Over-temp	If light source has thermally tripped, no light will be emitted until the light source returns to a safe operating temperature. (See Air Flow Section 3.4)

Table 6-1 Troubleshooting Guide

6.3 Optional Top Vent Configuration – Air Filters

Clean the fan filter on an as needed basis. The time interval will vary depending on the environment where the unit is installed.

1. Turn off the power to the fan by disconnecting the main power cord.
2. Remove the cover and filter (no tools required) and soak the filter in hot soapy water.

Note: Do not use abrasive scouring powders to clean the fan's parts. Never spray liquid into the fan itself or onto electrical parts.

3. If needed, wipe the fan unit down with dry paper towels.
4. After drying the filter, place it back into the fan guard and secure the filter in place with the plastic cover.
5. Reconnect main power cord.
6. Power up the unit

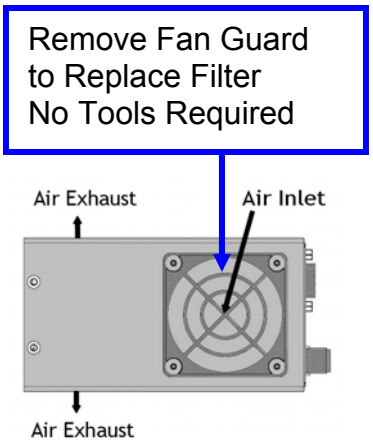

Figure 6-2 RX FireFly Fan Filter

Chapter 7

Warranty Policy

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7.3 GENERAL PACKING INSTRUCTIONS: 31

Summary

Phoseon Technology warranties our product under normal use. See Warranty Policy for further details.

7 Warranty Policy

7.1 Warranty Policy:

Thank you for purchasing a quality Phoseon Technology product. Supplier warrants that all equipment shall be free from defects in material and workmanship if properly installed, stored, maintained and operated by Buyer under normal use with competent supervision for a period of one (1) year from date of shipment to Buyer (see Terms & Conditions for full warranty specifications). Phoseon Technology will repair or replace, at its option, any defective parts when returned freight pre-paid by Buyer to Phoseon. Equipment damaged in transit, abused, misused, operated on incorrect power sources, or on which the factory seals have been broken (evidencing unauthorized intrusion), shall be excluded from warranty coverage. Determination of the suitability of the product or fitness to a particular purpose lies solely with the Buyer. Phoseon assumes no liability for any incidental or consequential damages or expense.

Equipment may not be returned, whether for warranty or other purposes, without prior authorization and issuance of a Returned Material Authorization Number by Phoseon Technology.

Phoseon Technology assumes no expense or liability for repairs made outside its facility without written consent or for any labor costs which are incurred.

If repair of equipment is required but return of such equipment to Phoseon Technology is not feasible, then by mutual consent of Phoseon and purchaser, an authorized Phoseon service representative will be sent to the purchaser's plant to effect necessary repairs. The purchaser will be charged for the representative's time and expenses.

Any repairs or alternations, including use of non-Phoseon parts, made by the user of this product without Phoseon's prior written consent shall void all warranties provided by Phoseon Technology and such warranties shall cease to be in effect. No allowance will be granted for such repairs or alterations. No person, agent, representative, or distributor is authorized to give any warranties on behalf of Phoseon Technology, or to accept for Phoseon Technology any other liability in connection with any Phoseon products.

This warranty excludes consumables such as fuses without regard to whether any claimed defects were discoverable or latent on the date of shipment.

The following are the standard product specifications unless otherwise agreed upon: Measurements to be taken at the output of the protective glass while operating continuously (maximum (peak) over output area):

RX FireLine: 125, 150, 225, 300 - 8W/cm^2
RX FireFly: 1.5W/cm^2 - 4W/cm^2
RX StarFire MAX: 75, 150, 300 - 4W/cm^2
RX StarFire: 100 - 2W/cm^2
RX StarFire: 150 - 1.75W/cm^2
RX FireFlex: 75 - 8W/cm^2

Note: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. If the equipment is not used in a manner as explicitly stated in the manual, then this shall be deemed to be misuse and will invalidate any warranty claim.

7.2 Procedure for Warranty Claims:

1. Obtain RMA Number from Phoseon Technology.
   Equipment may not be returned, whether for warranty or other purposes, without prior authorization and issuance by Phoseon Technology of a Returned Material Authorization Number.
   Please call +1.503.439.6446 or send email to info@phoseon.com to request an RMA number.
   Serial number of unit is required.
2. All Products being returned for warranty repair must be sent back to Phoseon Technology in original or comparable packaging (see below). Phoseon Technology shall not be responsible for items being exchanged that are lost or damaged in transit. Postage and handling charges both to and from Phoseon Technology must be paid the customer. We strongly recommend that you FULLY INSURE THE PACKAGE.
3. Phoseon will inspect non-functioning product to determine cause of failure. Loss of or damage to the covered product due to abuse, mishandling, improper packaging by you, alteration, accident, electrical current fluctuations or failure to follow operating, maintenance or environmental instructions prescribed in the covered product's User Manual is subject to a fee.
4. Replacement components are functionally tested before shipping.
5. A new or refurbished component, at Phoseon Technology's sole discretion, will be sent to the customer at the customer's expense.
6. Replacement components will be covered by the balance of the time remaining on the customer's original limited warranty or 90 days whichever is longer (unless otherwise specified).

7.3 General Packing Instructions:

If possible, original packaging materials should be reused for return shipment to Phoseon Technology. If Phoseon Technology's packaging materials are not used, equivalent packaging, as outlined in the following sections, is to be used.

Power Supply:
Box: Bursting Test: 24kg/cm^2 (350lbs/sq in)
Gross Weight Limit: 70kg (155lbs)
Fills: Rigid high density Styrofoam or cardboard fills as required to ensure power supply does not shift in box during shipment. Note: Packaging materials should not push against connectors or controls.

RX Series UV Light Source:
Box: Bursting Test: 24kg/cm^2 (350lbs/sq in)
Gross Weight Limit: 70kg (155lbs)
Fills: Rigid high density Styrofoam as required ensuring power supply does not shift in box during shipment. Note: Packaging materials should not push against glass or connectors or controls.

Appendix

Appendix Contents

APPENDIX A..... 33

Summary

The appendix provide data specifications to related items of the RX FireFly

Appendix A

Mean Well USA Model PLN-60-27

MEAN WELL 60W Single Output Switc ing Power Supply **PLN-60 series**

■ Features :
- Universal AC input / Full range
- Fully isolated plastic case with IP64 level
- Built-in constant current limiting circuit with adjustable OCP level
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in active PFC function
- IP64 design for indoor or outdoor installations
- UL1310,Class 2 power unit
- Cooling by free air convection
- 100% full load burn-in test
- Suitable for LED lighten and moving sign applications
- High realibility
- 2 years warranty

SELV LPS IP64

SPECIFICATION

MODEL		PLN-60-27
OUTPUT	DC VOLTAGE	27V
	RATED CURRENT	2.3A
	CURRENT RANGE	0 ~ 2.3A
	RATED POWER	62.1W
	RIPPLE & NOISE (max.) Note.2	2.7Vp-p
	VOLTAGE ADJ. RANGE	25 ~ 30V
	CURRENT ADJ. RANGE	3% ~ -25%
	VOLTAGE TOLERANCE Note.3	±10%
	LINE REGULATION	±4.0%
	LOAD REGULATION	±10%
	SETUP, RISE TIME	1500ms, 100ms / 230VAC 3000ms, 100ms / 115VAC at full load
INPUT	VOLTAGE RANGE Note.5	90 ~ 264VAC
	FREQUENCY RANGE	47 ~ 63Hz
	POWER FACTOR	PF>0.9/230VAC PF>0.98/115VAC at full load
	EFFICIENCY(Typ.)	87%
	AC CURRENT	0.8A/115VAC 0.4A/230VAC
	INRUSH CURRENT(max.)	40A/230VAC
	LEAKAGE CURRENT	0.5mA / 240VAC
PROTECTION	OVER CURRENT	130% (max)
		Protection type : Constant current limiting, recovers automatically after fault condition is removed
	SHORT CIRCUIT Note.4	Hiccup mode, recovers automatically after fault condition is removed.
	OVER VOLTAGE	31 ~ 35V
		Protection type : Shut down o/p voltage, re-power on to recover
	OVER TEMPERATURE	95℃ ±10℃ (TSW1) Detect on eatsink of power transistor
		Protection type : Shut down o/p voltage, recovers automatically after temperature goes down
ENVIRONMENT	WORKING TEMP.	-30 ~ +50℃ (Refer to output load derating curve)
	WORKING HUMIDITY	20 ~ 90% RH non-condensing
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. eac along X, Y, Z axes
SAFETY & EMC	SAFETY STANDARDS	UL1310 Class 2, CAN/CSA C22.2 No. 223-M91(except for 48V), EN61347-1, EN61347-2-13, IP64 Approved
	WITHSTAND VOLTAGE	I/P-O/P:4.25KVDC
	ISOLATION RESISTANCE	I/P-O/P:100M Ω ms/500VDC
	EMI CONDUCTION & RADIATION	Compliance to EN55015, EN55022 (CISPR22) Class B
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; ENV50204, EN55024,EN61547 Lig t industry level, criteria A
OTHERS	MTBF	497.8K rs min. MIL-HDBK-217F (25℃)
	DIMENSION	181*61.5*35mm (L*W*H)
	PACKING	0.5Kg, 24pcs/13Kg/0.75CUFT
NOTE	1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. Please refer to OLP characteristics. 5. Derating may be needed under low input voltage. Please check the derating curve for more details.	

File Name:PLN-60-SPEC 2007-01-18

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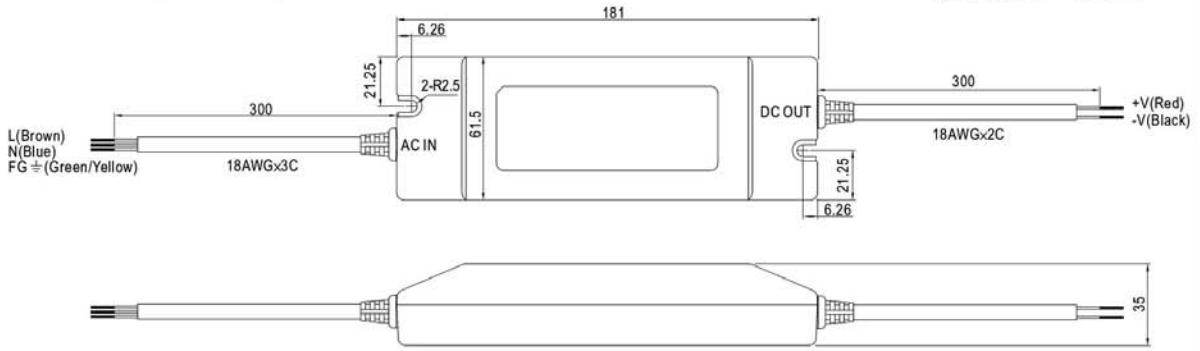
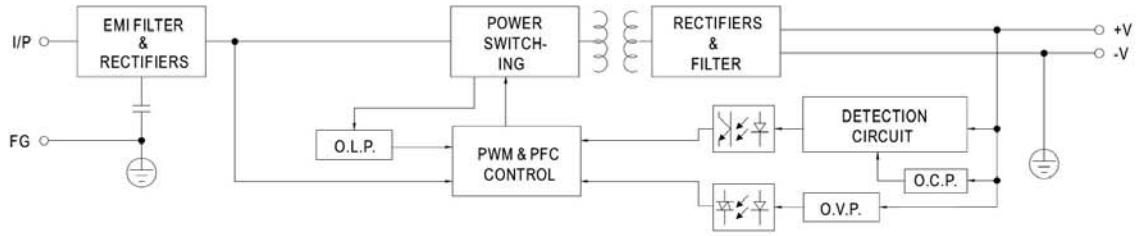
■ Mechanical Specification

Case No.960A Unit:mm

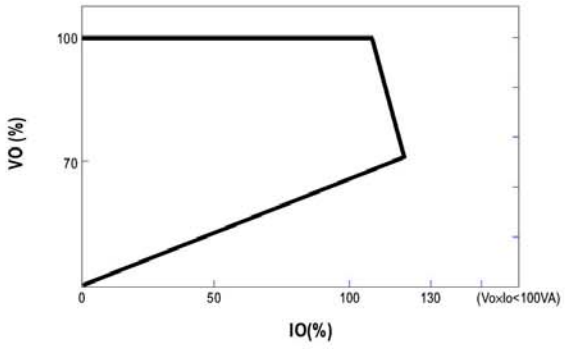


■ Block Diagram

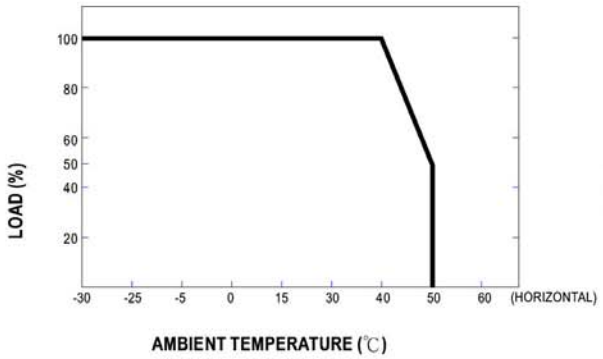
fosc : 90KHz(115VAC)
120KHz(230VAC)



■ OLP Characteristics



■ Derating Curve



■ Static Characteristics